

STARS ACADEMY LAHORE

Head office: 590-Q Main Boulevard, Johar Town Lahore, 0321-9432177, 0321-4693044, www.stars.edu.pk



Roll No. of Candidate _____

Name of Candidate _____

STARS ENTRY TEST SYSTEM-2021 (MDCAT)

Test Code: P-1 (Force & Motion)

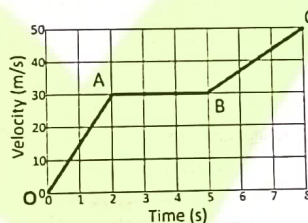
Time Allowed: 50 min

PHYSICS

- When a body is in motion, _____ always changes.
A) Its velocity
B) Its position vector
C) Its acceleration
D) Its momentum
- A ball of mass m travelling with velocity $5v$ collides with and sticks to a ball of mass $5m$ travelling in the same direction with velocity v . Their common velocity after the collision is:
A) v
B) $\frac{6v}{5}$
C) $\frac{8v}{10}$
D) $\frac{5v}{3}$

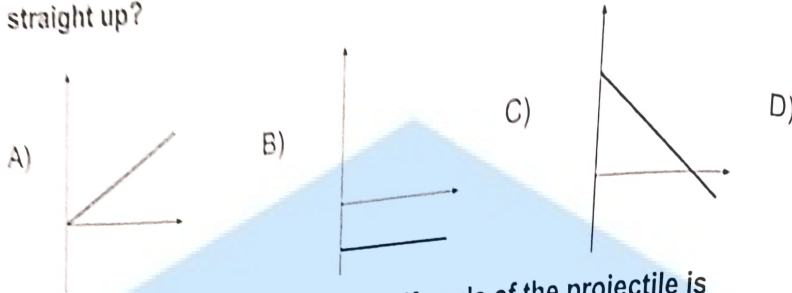
Question:3-5:

In the following graph, the velocity of an object as it moves along the path from O to C is plotted against time.



- The total distance covered by the object from O to C?
A) 240 m
B) 390 m
C) 250 m
D) 120 m
- The acceleration of the object during the travelling from A to B?
A) 30 m/s^2
B) -10 m/s^2
C) 10 m/s^2
D) 0 m/s^2
- The average speed of the object in ms^{-1} during 8 seconds is
A) Zero
B) 30
C) 20
D) none of these
- Ball "A" has mass m and is moving with velocity " v ". It makes a head-on elastic collision with a stationary ball "B" of mass $2m$. After the collision their speeds (v_A and v_B) are:
A) $0, v/2$
B) $-v, v$
C) $-v/3, 2v/3$
D) $-2v/3, v/3$
- A body is moving with an initial velocity of 2 kms^{-1} . After a time of 50 s its velocity becomes 1.5 kms^{-1} . Its acceleration will be:
A) 30 ms^{-2}
B) 40 ms^{-2}
C) -20 ms^{-2}
D) -10 ms^{-2}
- If a force of 12N is applied on a body and its momentum is changed from 60 kgms^{-1} to 36 kg ms^{-1} , then find the time during, which this force acts:
A) 1 second
B) 2 seconds
C) 12 seconds
D) 24 seconds
- If a body has 200 kg mass and its velocity gets reduced from 25 m s^{-1} to 20 m s^{-1} in 4 seconds, average retarding force on a body will be
A) -200N
B) -250 N
C) 200 N
D) 250 N

10. Which of the following graphs represents the velocity as a function of time of an object thrown straight up?



11. Range of projectile will be minimum if angle of the projectile is

- A) 0°
B) 60°

- C) 30°
D) 75°

12. For projectile motion in the absence of air resistance its _____:

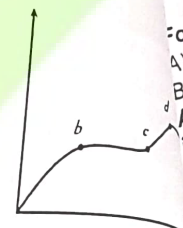
- A) Vertical speed is constant
B) K.E at maximum height is zero

- C) Horizontal acceleration is zero
D) Vertical acceleration is zero

13. The displacement versus time graph for a body moving in a straight line is shown in the figure. Which of the following regions represents the motion when no force is acting on the body?

- A) ab
B) bc

- C) cd
D) de



14. The range of the projectile depends upon the velocity of the projection and angle of the projection, i.e., 45° . For a fixed velocity, when the angle of projection is larger than 45° , which of the following is correct?

- A) Both the height and the range attained by the projectile will be less
B) Both the height and the range attained by the projectile will be more
C) The height attained by the projectile will be less but the range is more
D) The height attained by the projectile will be more but the range is less

15. Which of the given variable is present in all three equations of motion?

- A) Acceleration
B) Distance
C) Time
D) all of these

16. A player catches a ball of 150g moving 20ms^{-1} , it takes 0.1s to stop. The force exerted by ball in catching is

- A) 30N
B) 300N
C) $30,000\text{N}$
D) 0.3N

17. A projectile is launched at 45° to the horizontal with an initial kinetic energy E . Assuming air resistance to be negligible what will be the kinetic energy of the projectile when it reaches its highest point?

- A) $0.50E$
B) $0.70E$
C) $0.71E$
D) E

18. If the displacement of a particle is zero, then the distance covered

- A) Must be zero
B) Cannot be zero
C) Is negative
D) May or may not be zero

19. A car covers the first half of certain distance with speed V_1 and second half with speed V_2 , the average speed is:

- A) $\frac{V_1+V_2}{2}$
B) $\frac{2V_1V_2}{V_1+V_2}$
C) $\frac{2V_2}{V_1+V_2}$
D) $\frac{2V_1V_2}{V_1+V_2}$

20. Height of projectile is maximum at an angle of:

- A) 45°
B) 30°
C) 60°
D) 90°

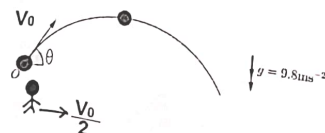
21. The horizontal range R and maximum range R_{max} of projectile are related as

- A) $R = R_{\text{max}} \sin^2 \theta$
B) $R = R_{\text{max}} \sin 2\theta$
C) $R = R_{\text{max}} \sin \theta$
D) $2R = R_{\text{max}} \sin^2 \theta$

22. A ball is thrown from a point with a speed v_0 at an angle of projection θ . From the same point and at the same instant person starts running with a constant speed $v_0/2$ to catch the ball. Will the person be able to catch the ball? If yes, what should be the angle of projection?

- A) Yes, 60°
B) No

- C) Yes, 30°
D) Yes, 45°



boy throws a height
A) 2m
B) 10cm
C) 10m
D) 10cm

For range
A) 90°
B) 45°
C) 60°
D) 30°

A stone is thrown from a height of 49m with an initial velocity of 61ms^{-1} . The time taken for the stone to reach the ground is
A) $2\pi\text{m}$
B) 6ms
C) 12ms
D) 18ms

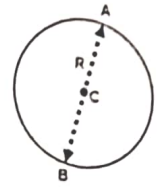
2.
3.

A boy throws a ball with velocity 10 m/s in vertically upward direction. If $g = 10 \text{ m/s}^2$, the ball rises to a height

- A) 2m
B) 10 cm

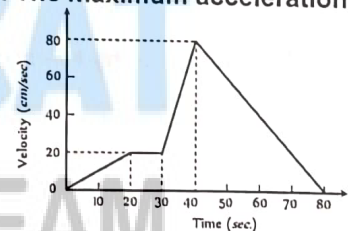
- C) 5m
D) 25 m

4. An object moves around a circular path of radius R . The object starts from point A, goes to point B and describes an arc of half of the circle. Which of the following is true about the magnitude of displacement and travelled distance: (as shown in the figure)



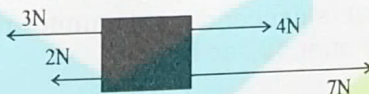
	Displacement	Travelled Distance
A)	R	$2\pi R$
B)	$2R$	πR
C)	$R/2$	R
D)	R	$4\pi R$

25. For range to have maximum value, the function $\sin 2\theta$ should have value
A) 90
B) 45
C) 1
D) 0
26. A particle moves along a semicircle of radius 10m in 5 seconds. The average velocity of the particle is
A) $2\pi \text{ ms}^{-1}$
B) 6 ms^{-1}
C) $4\pi \text{ ms}^{-1}$
D) 4 ms^{-1}
27. A stone falls from a balloon that is descending at a uniform rate of 12 m/s . The displacement of the stone from the point of release after 10 sec is
A) 490 m
B) 610 m
C) 510 m
D) 725 m
28. An object is thrown along a direction inclined at an angle of 45° with the horizontal direction. The horizontal range of the particle is equal to
A) Vertical height
B) Twice the vertical height
C) Thrice the vertical height
D) Four times the vertical height
29. Two perfectly elastic particles P and Q of equal mass travelling along the line joining them with velocities 15 m/sec and 10 m/sec . After collision, their velocities respectively (in m/sec) will be
A) 0, 25
B) 10, 15
C) 5, 20
D) 20, 5
30. If instantaneous acceleration equal to average acceleration, then body is moving with:
A) Variable acceleration
B) uniform acceleration
C) uniform velocity
D) increasing acceleration
31. The rate of change of momentum for a freely falling object is always:
A) $= mg$
B) $> mg$
C) $< mg$
D) zero
32. When two objects of masses " m_1 " and " m_2 " makes a collision such that linear momentum of them is said to be conserved then?
A) $m_1v_1 + m_2v_2 = m_1v'_1 + m_2v'_2$
B) $m \propto \frac{1}{v}$
C) No external force acts on bodies
D) All of these
33. The v-t graph of a moving object is given in the figure given below. The maximum acceleration is
A) 1 cms^{-2}
B) 2 cms^{-2}
C) 3 cms^{-2}
D) 6 cms^{-2}

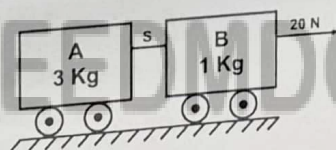


34. If an object moves with a constant velocity, we can conclude that
A) It is moving toward its natural place.
B) There are no forces acting on it.
C) There is no unbalanced (net) force acting on it.
D) It has a very large inertia
35. A ball with a weight of 20 N is thrown vertically upward. What is the acceleration of the ball just as it reaches the top of its path?
A) zero
B) 9.8 m/s^2 downward
C) 9.8 m/s^2 upward
D) The acceleration cannot be determined
36. When a block of wood of mass 2 kg is pushed along a horizontal flat surface of a bench, the force of friction is 4N. When the block is pushed along the bench with a force of 10N, it moves with a constant
A) Speed of 3 ms^{-1}
B) Acceleration of 3 ms^{-2}
C) Speed of 5 ms^{-1}
D) Acceleration of 5 ms^{-2}

37. A shell of mass 10 kg moving downwards with a velocity of 200 m/s explodes in mid air and two fragments of masses 5 kg each are produced. If velocity of one fragment is 100 m/s then velocity of other fragment is
- A) 100 m/s
B) 200 m/s
C) 300 m/s
D) 400 m/s
38. If K.E of a body is equal to the magnitude of its momentum, then the velocity of the body will be
- A) 1 m/s
B) 4 m/s
C) 2 m/s
D) 3 m/s
39. Which of the following is not true for distance (S) and displacement (D)?
- A) $S = d$
B) $S < d$
C) $S > d$
D) $S = \text{positive}$
40. A cricket ball is hit so that it travels straight up in air and it acquires 3 seconds to reach the maximum height. Its initial velocity is
- A) 10ms^{-1}
B) 29.4ms^{-1}
C) 15ms^{-1}
D) 12.2ms^{-1}
41. An object is thrown in horizontal with an initial velocity $V_i = 10\text{ m/s}$ from the roof of a building 20 m tall. How far from the building does it hit the ground?
- A) 5 m
B) 15 m
C) 10 m
D) 20 m
42. What will be the magnitude of acceleration produced in the body if the body has a mass of 2 Kg?



- A) 2.5 ms^{-2}
B) 12 ms^{-2}
C) 3 ms^{-2}
D) zero
43. A student drops a pebble from the edge of a vertical cliff. The pebble hits the ground 4 s after it was dropped. What is the height of the cliff?
- A) 20 m
B) 60 m
C) 40 m
D) 80 m
44. Range of a projectile on a horizontal plane is same for the following pair of angles:
- A) 15° and 18°
B) 20° and 80°
C) 43° and 47°
D) 52° and 62°
45. Newton's 2nd gives the measurement of:
- A) Acceleration
B) Momentum
C) force
D) inertia
46. Two forces each of magnitude 10N acting on a string in opposite direction, the tension in the string is:
- A) 10N
B) 40N
C) 20N
D) 0N
47. Distance covered by a freely falling body in 2 sec will be:
- A) 4.9 m
B) 19.6 m
C) 3.92 m
D) 44.1 m
48. For flat earth approximation and ignoring air friction; the trajectory of the projectile is:
- A) Straight line
B) Elliptic
C) Parabolic
D) Hyperbolic
49. The time taken by the projectile to reach its maximum height is:
- A) $\frac{2v_i \sin \theta}{g}$
B) $\frac{v_i \sin \theta}{g}$
C) $\frac{v_i \cos \theta}{g}$
D) $\frac{2v_i \cos \theta}{g}$
50. A two-car train, with data as given in Fig. is pulled by a child on a horizontal frictionless surface. The strings are massless. The force exerted by car A on the string S is:



- A) 10N
B) 20N
C) zero
D) 15N

Date: _____

Key (P1)

Day: M T W T F S

1 B	22 A	43 D
2 D	23 C	44 C
3 A	24 B	45 C
4 D	25 C	46 A
5 B	26 D	47 B
6 C	27 B	48 C
7 D	28 D	49 B
8 B	29 B	50 D
9 B	30 B	
10 C	31 A	
11 A	32 D	
12 A	33 D	
13 C	34 C	
14 D	35 B	
15 A	36 B	
16 A	37 C	
17 A	38 C	
18 D	39 B	
19 D	40 B	
20 D	41 D	
21 B	42 C	

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